



FLUID *forming*

 **FLUIDFORMING
AMERICAS**
HYDROFORMING REINVENTED

BUYER'S GUIDE

12 Things to Consider When
Buying a Metal Forming Machine



It's a major investment, so knowing what to consider when buying a metal forming machine is critical. We hope this buyer's guide will help your team find the metal forming machine that will serve your company as well in 25 years as it does today.

WHAT TO CONSIDER

When Buying a Metal Forming Machine:

- Precision
- Accuracy & repeatability
- Tooling
- Deep drawing
- Finish
- Flexibility
- Footprint & structural reinforcement
- Material compatibility
- Automation
- Sustainability
- Efficiency
- R&D Tax credits



PRECISION:
Benefits of Precision Metal Forming Machines

There are three primary types of precision metal stamping machines: traditional mechanical presses, traditional hydraulic presses, and bladderless hydroforming presses.

If you're looking for speed, **traditional mechanical presses** achieve the highest production volume—especially for simple, shallow-formed parts. However, with fixed stroke lengths, these presses are less adjustable and rely on costly progressive dies.

Repeatability and product finish quality may be a concern for some manufacturers in consumer-facing industries. Higher tooling and maintenance costs should be factored into the relatively low initial cost of mechanical machines.

Although **traditional hydraulic presses** can't achieve the high cycling speeds of mechanical presses, they're far more variable and perform better with complex shapes and geometries. Bladders used in a traditional hydraulic hydroforming press limit forming pressures to approximately 10,000 psi. Bladders are also prone to failure and can limit precision, repeatability, and may even leave friction marks, damaging

the finish of the final product. Non-conforming part waste, consumables, and post-production fixturing should be factored into the relatively low initial cost of these machines.

Bladderless hydroforming presses eliminate costly, rupture-prone bladders and environmentally harmful hydraulic fluid. These presses, which are used in the FluidForming process, achieve forming pressures of up to 60,000 psi, resulting in 99.996% accuracy and repeatability. Low tooling, operation, maintenance, and post-production costs and minimal material waste offset the higher initial cost of a bladderless hydroforming press.

ACCURACY & REPEATABILITY:

When Quality Matters

Keep your customers—both existing and future ones—in mind as you consider buying a metal forming machine. A key consideration: speed versus accuracy. What do your clients value today? What will their manufacturing priorities look like ten years from now? What kind of clients do you want to serve 15 years from now?

High-speed mechanical presses are a good choice when speed and production volume are more important than accuracy, repeatability, and quality. As manufacturing changes, however,

these high-volume, low-cost presses may not be the best option for all applications.

When precision, accuracy, and repeatability really matter, bladderless hydroforming comes out on top. The Six Sigma [FluidForming](#) process is ideal for the aerospace, medical, high-end home goods, and automotive industries. Other applications where precision metal forming may make a huge difference include three-dimensional designs, complex geometries, tight radii, and integrated lettering or branding.

TOOLING:

High Die Costs Add Up

Both mechanical stamping and traditional hydroforming rely on progressive dies to achieve acceptable levels of precision. Progressive tooling is costly and time-consuming and damages the overall ROI of these machines. Nested tooling is possible, but if progressive dies are involved, it becomes a costly process.

Bladderless hydroforming presses—like the [FormBalancers](#) used by the FluidForming process—achieve forming pressures of up to 60,000 psi. Typically the process requires just a single die from prototyping through production. In other words, the prototyping tool is the manufacturing tool. The presses also accommodate 3D-printed tools and are compatible with nested tooling.

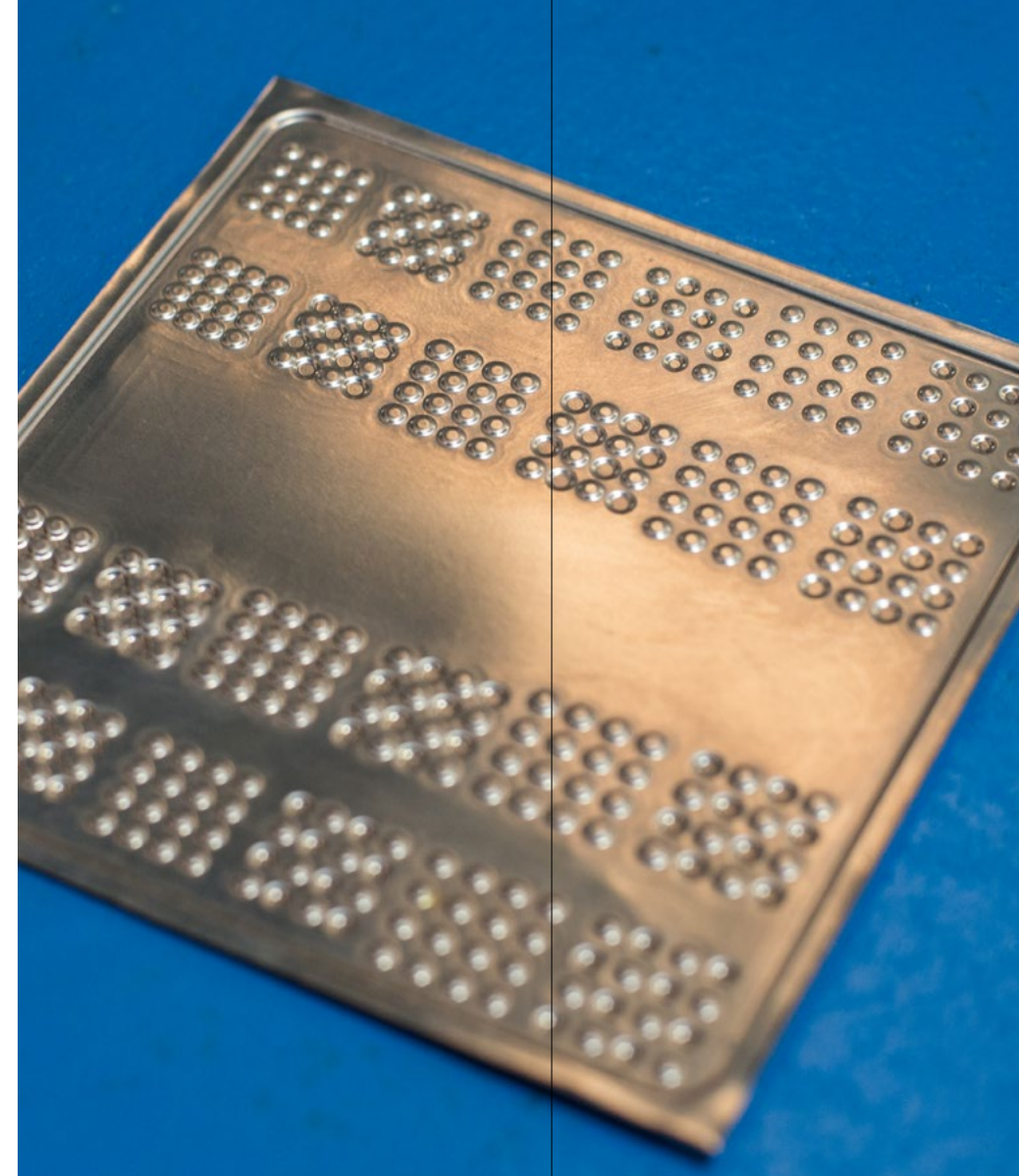




DEEP DRAWING:
Complex Shapes =
Interesting Products

Traditional mechanical presses work best on flat, shallow components that are generally produced from coil stock.

Traditional hydraulic hydroforming and bladderless hydroforming are solid choices for complex forms that require higher amounts of material flow. Legacy hydroforming has been used for generations to create fuel cells, automotive parts, valves, sinks, pans, and other three-dimensional parts. Because of the bladder's thickness, however, extremely tight



tolerances and integrated logos or lettering generally cannot be accommodated.

Bladderless hydroforming methods are better for textured and non-standard deep drawing shapes like stepped, domed, or tapered parts. It also does a better job maintaining a constant material thickness, even over a tight die corner radius where other methods experience significant thinning. Logos, lettering, and integrated branding can be accommodated.

FINISH:
Consider Finish
Quality and
Post-Production
Costs

When making a list of what to consider when buying a metal forming machine, it's easy to overlook post-production costs. If you stop to look at the big picture, downstream costs become an important consideration.

Once again, mechanical presses come out on top when production speed is your top priority. But the process is hard on the sheet metal, leaving scars, grooves, scratches, tears. The resulting downstream

costs like welding, polishing, annealing, painting, and polishing can be costly . . . and slow time-to-market.

While much easier on the metal, the bladders used in traditional hydroforming can still damage the surface of the finished product. Pre-finished, polished, or painted materials cannot withstand the friction of a traditional hydroforming bladder.

If you're manufacturing parts or components from pre-painted, textured, materials, bladderless hydroforming presses can produce nearly flawless products that require minimal post-production fixturing—therefore lowering costs and improving time-to-market.

FLEXIBILITY:
Get the Most out
of Your New Metal
Forming Machine

Mechanical presses are the fastest, but they lack flexibility. Again, if speed is king, you've found your leader.

Hydraulic hydroforming presses are capable of variable stroke lengths and variable slide velocities, but they're limited to sheet metal forming.

If process flexibility and flexibility in manufacturing capabilities are important business considerations

—think sheet metal forming *and* tube forming)—then you may want to invest in a bladderless, force-contained press. Like a conventional hydroforming press, bladderless machines offer users a high degree of control and variability throughout the entire metal forming process.

The FluidForming FormBalancer press is the only precision metal forming machine on the market capable of bladderless sheet metal forming, deep draw hydroforming and **tube forming**. In instances where bladder-based or hydraulic hydroforming would work best, the machines can also be configured to accommodate a bladder.



MATERIAL COMPATIBILITY:

Lightweight is the New Heavyweight

Most precision presses can process precious metals, ferrous metals, non-ferrous metals, and non-standard alloys (Thomasnet).

Aerospace, energy, medical equipment, electric vehicle, and EV battery manufacturers, for example, increasingly value strong and lightweight components—which improve performance and lower fuel consumption. With this

in mind, it may be wise to consider a press that can accommodate the metals of tomorrow.

Bladderless high-pressure processes also accommodate superalloys. Even aluminum alloys, which are notoriously prone to wrinkling and fracturing under stress, perform well with the FluidForming technology and FormBalancer presses.

FOOTPRINT AND STRUCTURAL REINFORCEMENT:

How Big is Too Big?

Depending on the capabilities of the machine, mechanical presses can take up a lot of square footage and may require costly foundational and structural reinforcements like pits and anti-vibration devices.

Hydraulic presses also require structural reinforcement.

Force-contained, bladderless presses do not require additional footings or reinforcement. Compact, modular press design allows for flexible floor placement. Multiple machine and table sizes—which range from 800 mm x 800 mm to 1,300 mm x 2,000 mm—can accommodate a variety of jobs.



AUTOMATION:

Improve Efficiency and Streamline Production

Regardless of the press type, most modern precision metal stamping machines are computer-controlled and are relatively easy to automate. Better automation capabilities also improve efficiency and help support [Lean manufacturing](#).

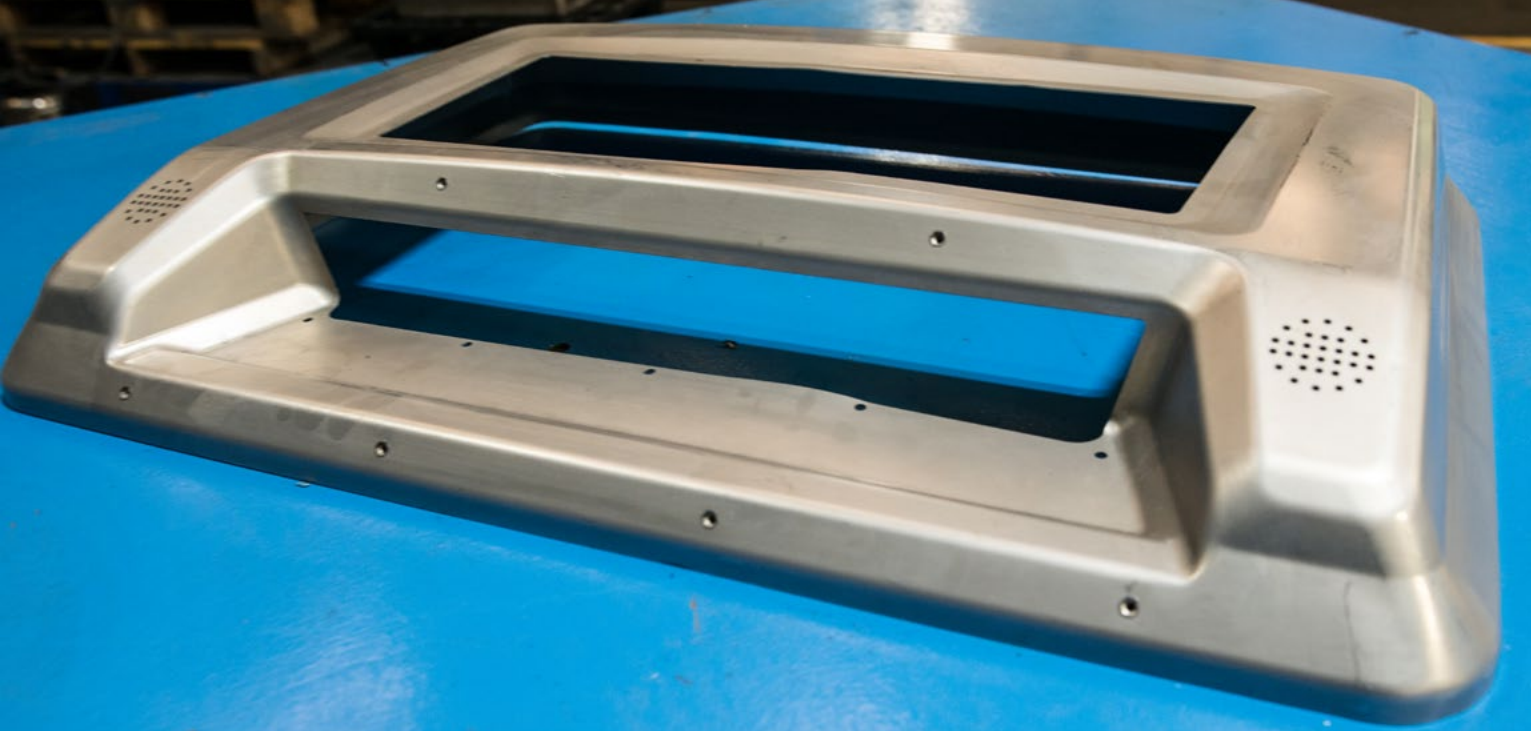
SUSTAINABILITY:

Making Manufacturing Greener & Lowering Operating Costs

As cold-forming processes, mechanical and hydraulic presses are infinitely greener than legacy die casting. However, energy consumption, material waste, hydraulic fluids, and other consumables render them less sustainable than bladderless metal presses.

For an even more sustainable option with low operating costs, consider a 480V FormBalancer press. The bladderless press relies on water as the forming force and draws just 90-200 kW of power, depending on machine size.





EFFICIENCY:

Where Purchasing and Manufacturing Come Together

MetalForming Magazine recently posed the excellent question: “How can a purchasing department work with its manufacturing team to find ways to continue investing in new technology?”

Here’s their answer, in a nutshell: “There are four key factors when considering capital investments: price, performance, delivery and the ability to provide turnkey solutions.”

One new machine, they note, “May allow a stamper to replace two or three aging presses. Efficiency skyrockets, as you conserve floor space and human capital. In many instances, the older equipment will not be able to process higher-strength steels or aluminum alloys in the tolerances required—particularly when producing electric-vehicle equipment. As such, new press technology will help stampers stay competitive.

R&D TAX CREDIT:

Yes, there’s a lot to consider when buying a metal forming machine. But let’s not overlook the importance of the [Research & Development Tax Credit](#). The R&D tax credit is available to companies developing new or improved business components. This includes new products or processes—like a new metal forming machine.

The R&D Tax Credit is a dollar-for-dollar tax savings that directly reduces your company’s tax liability. There is no limit to the amount of expenses and credit that you can claim each year. If the federal R&D credit can’t be used immediately, then the unused credit can be carried back for one year and forward for up to 20 years. State carryover rules vary. (Source: MossAdams).



How is the FluidForming Process Different from Hydroforming?

FluidForming is better. It’s the first major advancement in metal forming since the 1930s and it differs from traditional hydroforming in several significant ways.

- High forming pressures of up 4,000 bar/60,000 psi yield Six Sigma accuracy.
- Bladder-free technology reduces maintenance costs and improves precision and finish quality.
- 99.996% first-pass-yield rate.
- Environmentally friendly.
- Low overall total cost of ownership.



We handmade these parts for years and now we have them manufactured by FFA with Six Sigma quality. Thanks to the flexibility of the FFA process, we were able to increase the tank content volume by 34.5% giving our customers a much-improved life cycle between refills — which is a huge competitive advantage for us.

TITLE: Project Manager
INDUSTRY: Instrumentation
PRODUCT: Liquid Nitrogen Tank



The collaboration in part development with FluidForming Americas has enabled us to optimize our product with no additional cost and no time lost to the project. We avoided significant manufacturing pitfalls thanks to FluidForming.

TITLE: Engineering Manager
INDUSTRY: Automotive
PRODUCT: Heat Exchanger

Can FluidForming Streamline Manufacturing and Accommodate Rapid Prototyping?

FluidForming is faster. FluidForming is compatible with 3D printing and is the ideal solution for rapid prototyping.

- 3D printed tooling slashes tooling costs and dramatically improves time-to-market.
- Prototyping tools are the same as production tools.
- Finite Element Analysis (FEA) minimizes trial and error and maximizes efficiency.
- Ideation to production can happen in days, rather than weeks or even months.
- Nested tooling capabilities facilitate undercuts, logos, and sharp angles while reducing production time and further minimizing tooling costs.



What can FluidForming Achieve that Traditional Hydroforming or Die Stamping Cannot?

FluidForming is smarter. With an emphasis on perfection, quality, and innovation, we always ask our clients if they’ve been settling for less.

- Perfection: FluidForming is the only metal forming technology that can form highly complex valves, precision microchannel heat exchangers, and flawless defense-grade satellite dishes perfectly every time.
- Quality: FluidForming enables companies to manufacture parts that were previously impossible to form from metal. FluidForming’s bladder-free and water-based technology encourages the use of painted, patterned, and prefinished metals with minimal post-fixturing costs.
- Innovation: FluidForming enables new parts and products to be brought to the market more quickly and more affordably.



Part accuracy has gone from no-two-parts-are-alike to Six Sigma conformance and repeatability with 0% non-conforming product.

TITLE: Vice President
INDUSTRY: Communications
PRODUCT: Precision Satellite Dish

FluidForming: *Better Physics, Better Business*

The fundamental physics of the [FluidForming](#) process differs significantly from traditional hydraulic, bladder-based hydroforming, metal spinning, and die stamping.

With pressures of up to 4,000 bar/60,000 psi, highly detailed parts with complex geometries can be formed with a 99.996% first-pass-yield rate. FluidForming's bladder-free technology simultaneously reduces maintenance costs and improves precision and finish quality.

Advantages and Benefits of FluidForming

FluidForming Americas' metal forming machines, [FormBalancers](#), achieve the highest forming pressures and exceed the capabilities of any press on the market. Multiple machine and table sizes—which range from 800 mm x 800 mm to 1,300 mm x 2,000 mm—can accommodate a variety of jobs.

Quality Advantages of FluidForming

- Six Sigma quality, accuracy, and repeatability.
- Eliminates bladder friction and tool marks.
- Accommodates the formation of complex shapes.
- Forms detailed impressions and microchannels.
- Accommodates undercuts.
- Minimizes springback and material thinning.
- Increases dimensional stability.
- Encourages creative and innovative design.
- Finite Element Analysis (FEA).
- Enables the use of pre-painted, polished, and patterned materials.

Cost-Saving Benefits of FluidForming

- Reduces secondary operations or post-production fixturing.
- Uses a single die from prototyping through production.
- Reduces the use of consumables.
- Eliminates bladders and the risk of bladder ruptures.
- Lowers scrap costs.
- Minimal material waste.
- Nested tooling capabilities.
- Accommodates die inserts and product branding.
- Clean and quiet operation.
- Reduces overall energy costs.
- Shortens product development cycles.
- Accelerates time-to-market.

MEET THE FORMBALANCER

FluidForming Americas is the first to offer an unprecedented combination of technologies incorporated into a single machine. 4-in-1 hydroforming machines, known as FormBalancers, have the following metal forming capabilities:

- Bladderless sheet metal forming
- Tube forming
- Bladder-based hydroforming
- Hydraulic hydroforming

The patented, force-contained structure permits extremely high forming pressures of up to 4,000 bar/60,000 psi. The modular design and multiple machine sizes allow for flexible floor placement. The machine's compact design requires a minimal factory footprint and does not necessitate any special structural reinforcements. Operators can transition between metal forming functions within minutes.

“The consistent quality and repeatability of FluidFormed parts have reduced our secondary labor costs in fit-up and reduced workers' compensation claims by substantially reducing on-the-job injuries.”

TITLE: *Engineering Manager*
INDUSTRY: *Agriculture*
PRODUCT: *Exhaust Fitting*

FluidForming FormBalancer Specifications

FormBalancer		FB 25	FB 35	FB 42	FB 50	FB 60	FB 80	FB 80L	FB 100
Tool Clamping Force	kN	25,000	35,000	42,000	50,000	60,000	80,000	80,000	100,000
	ton	2,500	3,500	4,200	5,000	6,000	8,000	8,000	10,000
Table Size	mm	800x800	1,000x1,200	1,200x1,200	1,200x1,500	1,300x1,600	1,500x1,800	1,300x2,000	1,500x2,000
	inch	31.5x31.5	39.4x47.2	47.2x47.2	47.2x59.1	51.2x63	59.1x70.9	51.2x78.7	59.1x78.7
Max Forming Depth	mm	300	450	500	500	550	600	600	600
	inch	~11.8	~17.7	~19.7	~19.7	~21.7	~23.6	~23.6	~23.6
Max Forming Pressure	psi	~60,000	~60,000	~60,000	~60,000	~60,000	~43,511	~43,511	~43,511
	bar	~4,000	~4,000	~4,000	~4,000	~4,000	~3,000	~3,000	~3,000

FluidForming FormBalancer Installation Requirements

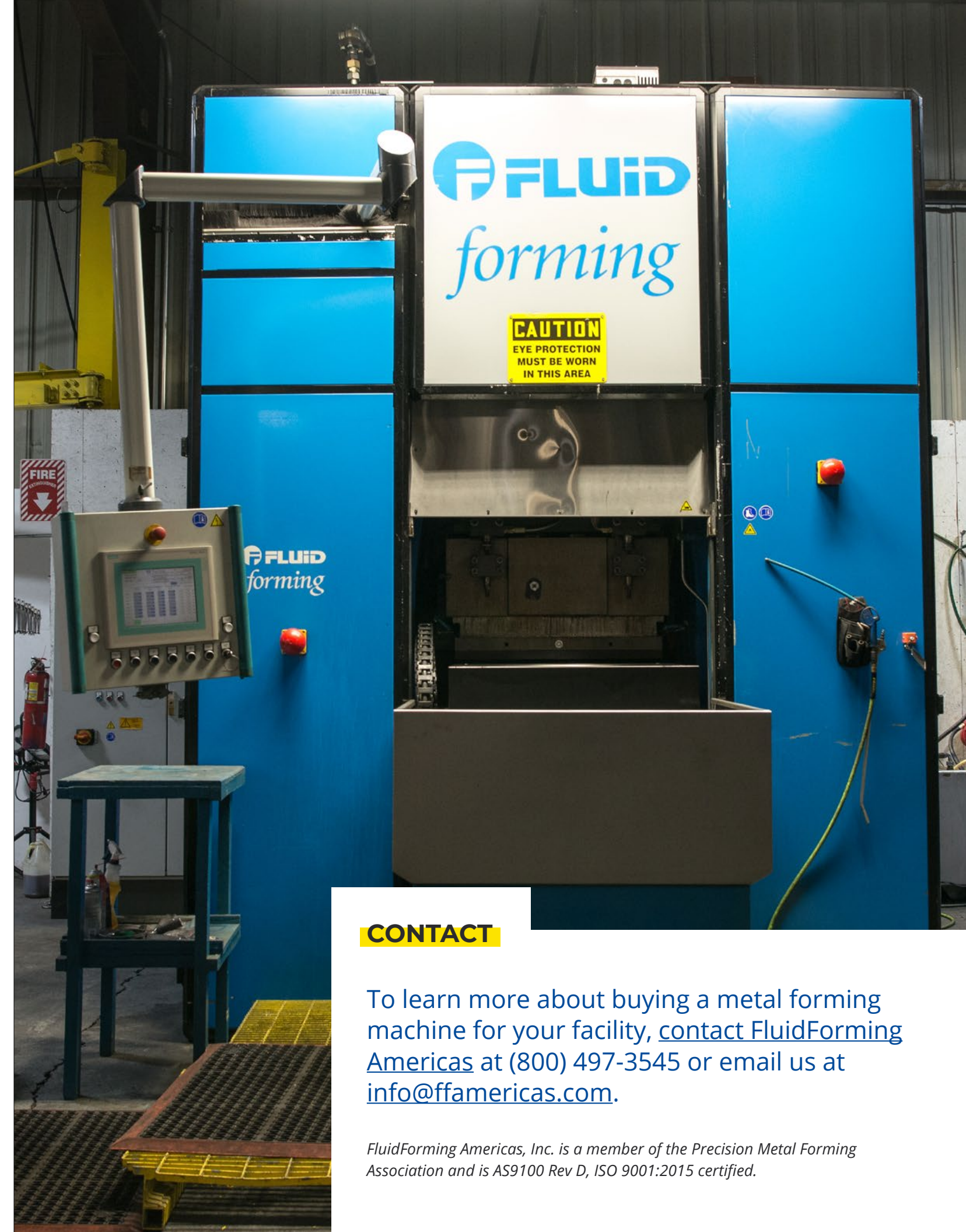
FormBalancer		FB 25	FB 35	FB 42	FB 50	FB 60	FB 80	FB 80L	FB 100
Width	meters	2.7	3.4	3.7	4.5	4.5	5	4.5	5
	feet	8.9	11.2	12.1	14.8	14.8	16.4	14.8	16.4
Height	meters	4	4.2	4.5	4	4.5	6	5	5.5
	feet	13.1	13.8	14.8	13.1	14.8	20	16.4	18
Depth	meters	4	6.1	6.1	5.5	6	8.5	7	7
	feet	13.1	20	20	18	19.7	28	23	23
Electrical Power (Installed)	V/Hz	480/60	480/60	480/60	400/50	400/50	480/60	400/50	400/50
	kW	90	130	130	200	200	200	250	300

Metal Forming Press COMPARISON

	 DIE STAMPING	 HYDRO FORMING	 METAL SPINNING	 FLUID FORMING
Requires special footings/foundations	✓			
Requires progressive tooling/dies	✓			
High tooling/die maintenance costs	✓	✓	✓	
Nested tooling/die capabilities				✓
Compatible with 3D-printed tools/dies				✓
Prototyping tool/die same as production tool/die			✓	✓
Low maintenance costs				✓
Low total cost of ownership				✓
4-in-1 metal forming machine*				✓
Water forming force				✓
Bladder-free	✓		✓	✓
Oil-free				✓
Lubricant-free				✓
Cycle time	N/A	60-90 secs	60 secs	45 secs
Rapid prototyping capabilities			✓	✓
Dual tooling sleds double throughput				✓
Robotic material handling				✓
Forming pressures up to 60,000 psi				✓
99.996% first-pass-yield rate/Six Sigma				✓
Minimal post-production operations				✓
Complex geometries and undercuts				✓
Integrated branding and logo capabilities				✓
Compatible with pre-finished, pre-painted, and patterned metals				✓
Energy efficient				✓
Small carbon footprint			✓	✓
Low-decibel output				✓

*tube forming, sheet metal forming, bladder-based, hydraulic hydroforming

FluidForming Americas works with clients to manufacture highly precise components to desired specifications. FormBalancers are also available for purchase.



CONTACT

To learn more about buying a metal forming machine for your facility, [contact FluidForming Americas](mailto:info@ffamericas.com) at (800) 497-3545 or email us at info@ffamericas.com.

FluidForming Americas, Inc. is a member of the Precision Metal Forming Association and is AS9100 Rev D, ISO 9001:2015 certified.



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